

Tactical Control System (TCS) to NWCS - Prototype Interface Design Description



Prepared for:
Program Executive Officer, Cruise Missiles Project
and Unmanned Air Vehicles Joint Project

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Date: _____

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1. Scope

This Interface Design Description (IDD) defines the interface between the Tactical Control System (TCS) and the Naval Surface Fire Support (NSFS) Weapon Control System — Prototype (NWCS-P).

1.1 Identification

This TCS IDD identifies, specifies, and establishes the detailed interface requirements for the TCS interfaces with the NWCS-P Command, Control, Communications, Computers, and Intelligence (C⁴I) system. This version of the NWCS-P IDD (Version 1.0) documents the TCS to NWCS-P communications interfaces for the Joint Warrior Interoperability Demonstration 1997 (JWID97) only. This IDD specifies requirements levied on the TCS, and does not impose any requirements on the C⁴I System addressed in this document. This IDD further specifies the methods to be used to ensure that each system interface requirement has been met. This IDD is published in accordance with Data Item Description (DID) DI-IPSC-81436, dated 941205, and modified to incorporate the qualification provisions section that is traditionally found in the Interface Requirements Specification (IRS). This IDD will be revised at the conclusion of the Program Definition and Risk Reduction period of the TCS program and will be re-issued in final form to be used during the follow-on TCS Engineering and Manufacturing Development period.

1.2 System Overview

The purpose of the TCS is to provide the military services with a single command, control, data receipt, data processing, data export, and data dissemination capability that is interoperable with the family of all present and future tactical unmanned aerial vehicles and designated C⁴I systems. These UAVs shall include the Tactical Unmanned Aerial Vehicle (TUAV) and the Medium Altitude Endurance (MAE) UAV (henceforth referred to as Outrider and Predator, respectively), with their associated payloads. Designated C⁴I and other systems that TCS will be interoperable with are detailed in paragraph 1.2.3 below. The TCS will also be capable of receiving and processing information from High Altitude Endurance (HAE) UAVs and their associated payloads, as well as being capable of providing interoperability with future development tactical UAVs and payloads.

1.2.1 TCS Program, Phases, and UAV Interaction

The Unmanned Aerial Vehicle Joint Project Office (UAV JPO) has undertaken development of a TCS for UAVs. Design and development of the TCS will be conducted in two phases. Phase 1 is defined as the Program Definition and Risk Reduction phase, and Phase 2 is defined as the Engineering and Manufacturing Development phase in accordance with Department Of Defense Instruction (DoDI) - 5000.2R. During Phase 2, TCS Low Rate Initial Production (LRIP) will commence. Phase 1 will be a 24 month period and will demonstrate Level 1 through Level 5

interaction (as defined below) in an Incremental and Evolutionary strategy as described in accordance with MIL-STD-498. The five discrete levels of multiple UAV interaction to be provided by the TCS are:

- Level 1: receipt and transmission of secondary imagery and/or data
- Level 2: direct receipt of imagery and/or data
- Level 3: control of the UAV payload in addition to direct receipt of imagery/data
- Level 4: control of the UAV, less launch and recovery, plus all the functions of level three
- Level 5: capability to have full function and control of the UAV from takeoff to landing

1.2.2 Tactical Control System

The TCS is the software, software-related hardware, and the extra ground support hardware necessary for the control of the TUAV, the MAE UAV, and future tactical UAVs. The TCS will also provide connectivity to specific C⁴I systems. The TCS will have the objective capability of receiving High Altitude Endurance (HAE) UAV payload information. Although developed as a total package, the TCS will be scaleable to meet the user's requirements for deployment. The TCS will provide a common Human-Computer Interface (HCI) for tactical airborne platforms to simplify user operations and training, and to facilitate seamless integration into the Services' joint C⁴I infrastructure across all levels of interaction.

1.2.2.1 Software

The major focus of the TCS program is software. The software will provide the UAV operator the necessary tools for computer related communications, mission tasking, mission planning, mission execution, data receipt, data processing, limited data exploitation, and data dissemination. The software will provide a high resolution computer generated graphics user interface that enables a UAV operator trained on one system to control different types of UAVs or UAV payloads with a minimum of additional training. The TCS will operate in an open architecture and be capable of being hosted on computers that are typically supported by the using Service. Software developed will be Defense Information Infrastructure / Common Operating Environment (DII COE) compliant, non-proprietary, and the architectural standard for all future tactical UAVs. To the extent possible, the TCS will use standard DoD software components to achieve commonality. The TCS will provide software portability, scaleable functionality, and support for operational configurations tailored to the users' needs.

1.2.2.2 Hardware

To the extent possible, the TCS will use standard Department of Defense (DoD) components in order to achieve commonality. The TCS will use the computing hardware specified by the service specific procurement contracts. The individual armed services will identify TCS

computing hardware, the desired level of TCS functionality, the battlefield C⁴I connectivity, and the particular type of air vehicle and payloads to be operated depending upon the deployment concept and area of operations. The TCS hardware must be capable of being scaled or modularized to meet varying Service needs. The TCS hardware will permit long range communications from one TCS to another, data storage expansion, access to other computers to share in processing capability, and multiple external peripherals.

1.2.3 Integration with Joint C⁴I Systems

The TCS integration with C⁴I systems will be accomplished through development of interfaces that permit information exchange between the TCS and specified C⁴I systems. The TCS will be capable of entering DII COE compliant networks. Network interoperability will include but not be limited to:

- Army Mission Planning System (AMPS)
- Advanced Tactical Weapons Control Station (ATWCS)
- Advanced Field Artillery Tactical Data System (AFATDS)
- Air Force Mission Support System (AFMSS)
- All Source Analysis System (ASAS)
- Automated Deep Operations Coordination System (ADOCS)
- Automated Target Handoff System (ATHS)
- Closed Circuit Television (CCTV)
- Common Operational Modeling, Planning, and Simulation System (COMPASS)
- Contingency Airborne Reconnaissance System (CARS)
- Enhanced Tactical Radar Correlator (ETRAC)
- Guardrail Common Sensor/Aerial Common Sensor (ACS) Integrated Processing Facility (IPF)
- Intelligence Analysis System (IAS)
- Joint Deployable Intelligence Support System (JDISS)
- Joint Maritime Command Information System (JMCIS)
- Joint Service Imagery Processing System - Air Force (JSIPS-AF)
- Joint Service Imagery Processing System - Navy (JSIPS-N)
- Joint Standoff Target Attack Radar System (JSTARS) Ground Station Module/Common Ground Station (GSM/CGS)
- Modernized Imagery Exploitation System (MIES)
- Naval Surface Fire Support (NSFS) Weapon Control System — Prototype (NWCS-P).
- Tactical Aircraft Mission Planning System (TAMPS)
- Tactical Exploitation Group (TEG)
- Theater Battle Management Core System (TBMCS)
- TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT) II

Figure 1-1 shows the planned implementation schedule for C⁴I interface realization. The TCS will export and disseminate UAV imagery products, tactical communication messages, as well as

mission plans and target coordinates. The TCS will also receive, process, and display tasking orders and operational information from service specific mission planning systems.

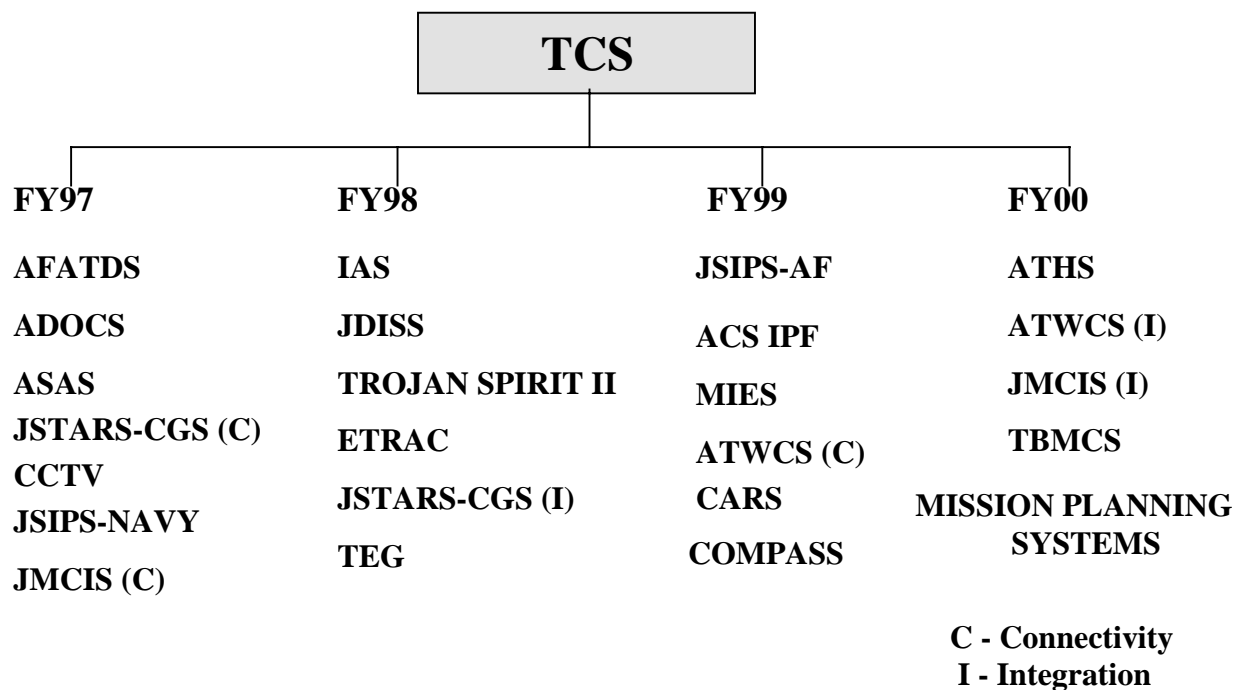


Figure 1-1. TCS C⁴I Systems Integration Plan

1.2.4 System Compliance

The TCS will be developed in compliance with the following military and commercial computing systems architecture, communications processing, and imagery architecture standards:

- DoD Joint Technical Architecture (JTA), Version 1.0
- DII COE
- Computer Open Systems Implementation Program (COSIP)
- Common Imagery Ground/Surface System (CIGSS) Handbook
- Variable Message Format (VMF) and Joint Message Format (JMF)
- National Imagery Transmission Format (NITF)

1.3 Document Overview

This document was developed using MIL-STD-498 (Data Item Description DI-IPSC-84136) as a guide, and is divided into the following sections:

- | | |
|------------|---|
| Section 1 | <u>Scope</u> : Provides identification of the systems, interfacing entities, and interfaces which are addressed in this IDD; and gives a brief overview of these systems. |
| Section 2 | <u>Referenced Documents</u> : Lists all referenced documents applicable to this development effort. |
| Section 3 | <u>Interface Design</u> : Identifies and describes the characteristics of the interface(s) defined in this IDD. |
| Section 4 | <u>Qualification Provisions</u> : Defines the qualification methods which are used to ensure that the requirements of this interface have been met. |
| Section 5 | <u>Requirements Traceability</u> : This section has been tailored out of this IDD. |
| Section 6 | <u>Notes</u> : Provides background information regarding the NWCS-P C ⁴ I system addressed in this IDD; and a list of acronyms and abbreviations used in this IDD. |
| Appendix A | TACFIRE Message Text Formats. |
| Appendix B | Tables of Legal Values for Target Types |

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2. **Referenced Documents**

This section identifies the applicable documents for this IDD.

2.1 **Government Documents**

The following documents of the exact issue shown form part of this IDD to the extent specified herein. In the event of conflict between the documents referenced herein and the content of this IDD, the content of this IDD will be considered a superseding requirement.

2.1.1 **Specifications** — None.

FSSIS-IS-0001 Revision B, Paragraph 4.4.7.6 1 September 1994	Interface Specification for Field Artillery Battalion (Cannon) (Advanced Field Artillery Tactical Data System) Interface with Field Artillery Battery (Cannon) (Battery Computer System), CECOM Software Directorate
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2.1.2 **Standards**

Federal — None.

Military —

MIL-STD-498 5 Dec. 1994	Software Development and Documentation Standard
MIL-STD-2500A 12 October 1994	National Imagery Transmission Format (NITF) Standard (Version 2.0)
MIL-STD-6040 1 January 1998	U.S. Message Text Formatting Program, Description of U.S. Message Text Formatting Program
VMF TIDP-TE Reissue 1, February 1995	Variable Message Format (VMF) Technical Interface Design Plan - Test Edition (TIDP - TE), the J-Series Family of Message Standards in the DoD JTA

Other Government Agency —

DoD JTA Ver. 1.0 22 August 1996	Department of Defense (DoD) Joint Technical Architecture (JTA), Version 1.0
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2.1.3 Drawings — None.

2.1.4 Other Publications

Reports —

NSWCDD/96-XX 9 Dec. 1996	Operational Concept Document for the TCS (Draft)
JROCM 011-97 Version 5.0 3 February 1997	Operational Requirements Document (ORD) for UAV TCS
DISA XXX.XX 14 February 1996	DII COE Baseline, Version 1.0, Preliminary Draft
DII COE I&RTS January 1997	DII COE Integration and Runtime Specification (I&RTS), Revision 3.0
TCS-235 September 1997	TCS to C ⁴ I Systems Interface Description

Regulations — None.

Handbooks —

CJCSM 6120.05 1 January 1998	Manual for Tactical Command and Control Planning Guidance for Joint Operations, Joint Interface Operational Procedures for Message Text Formats
CIGSS-Hdbk Version 1.0 19 July 1995	CIGSS Acquisition Standards Handbook
MIL-HDBK-1300A 12 October 1994	National Imagery Transmission Format (NITF)

Bulletins — None.

Lists —

JIEO Circular 9152 1 January 1998	Repository of United States Message Text Formatting (USMTF) Program Items for U.S. Implementation Guidance
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2.2 Non-Government Documents

The following documents of the exact issue shown form part of this IDD to the extent specified herein. In the event of conflict between the documents referenced herein and the content of this IDD, the content of this IDD will be considered a superseding requirement.

2.2.1 Specifications — None.

2.2.2 Standards

ISO/IEC 8802-3: 1996 [ANSI/IEEE Standard 802.3, 1996 Edition]	Information technology--Local and metropolitan area networks--Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications [Ethernet Local Area Network (LAN) 10BASE-T Specification]
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2.2.3 Drawings — None.

2.2.4 Other Publications — None.

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3. Interface Design

The NWCS-P shall have the functionality to send Tactical Fire direction system (TACFIRE) messages to the TCS and to accept UAV Imagery and TACFIRE messages. The NWCS-P performs targeting, assessment, and mission tasking functions using target positions obtained from intelligence data bases, the Common Operational Picture (COP), Military Strategic and Tactical Relay (MILSTAR) satellite broadcast voice, and UAV target messages. The NWCS-P, following appropriate assessment of potential targets from the multiple sources of information, shall issue the order to fire.

3.1 Interface Identification/Diagram

This IDD specifies the design characteristics of the interface between the TCS and the NWCS-P system as shown in Figure 3-1, the TCS/NWCS-P Interface Block Diagram. Figure 3-2 shows the TCS/NWCS-P interface connectivity in the JWID97 demonstration.

3.2 TCS to NWCS-P Interface

3.2.1 Priority of Communications Interface (Not applicable to these interfaces.)

3.2.1.1 TCS Priority (Not applicable to these interfaces.)

3.2.1.2 Data Link Priority (Not applicable to these interfaces.)

3.2.2 Type of Communications Interface

The TCS and NWCS-P shall communicate through pre-defined message formats. The transmission method for these messages shall vary depending on the relative location of the two systems, and the available communications hardware. The interface types are as follows:

- a. In cases where the systems are connected to a common Wide Area Network (WAN) or Local Area Network (LAN) infrastructure, they shall communicate via the Simple Mail Transport Protocol (SMTP) capabilities resident on the WAN or LAN, using an e-mail software tool.
- b. In cases where the systems are connected to a common Wide Area Network (WAN) or Local Area Network (LAN) infrastructure, and SMTP communication is not supported or otherwise impractical, they shall communicate by use of a common mount point (a common directory on the LAN or CWAN) on either the TCS or NWCS-P computer.

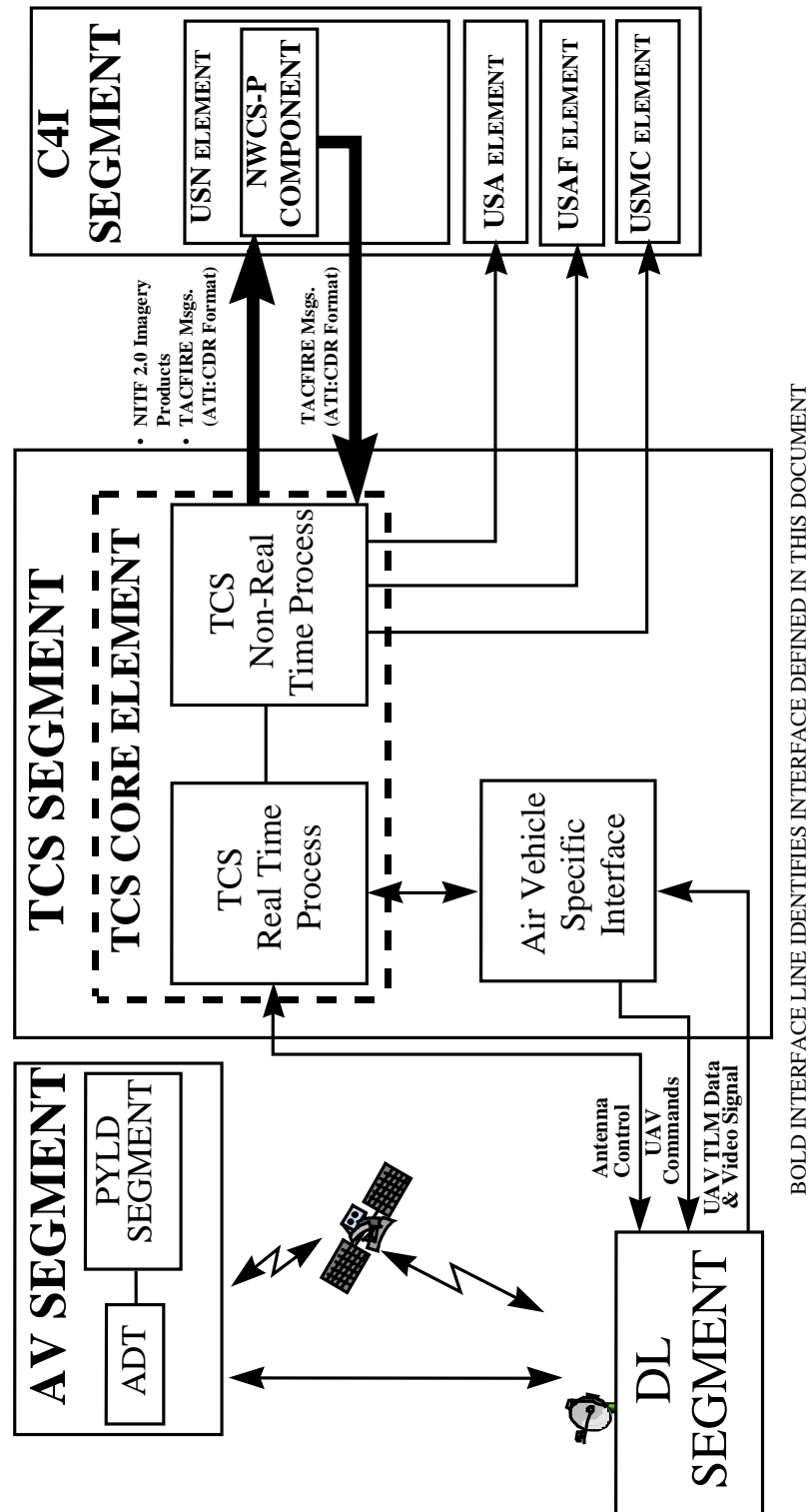


Figure 3-1. TCS/NWCS-P Interface Block Diagram.

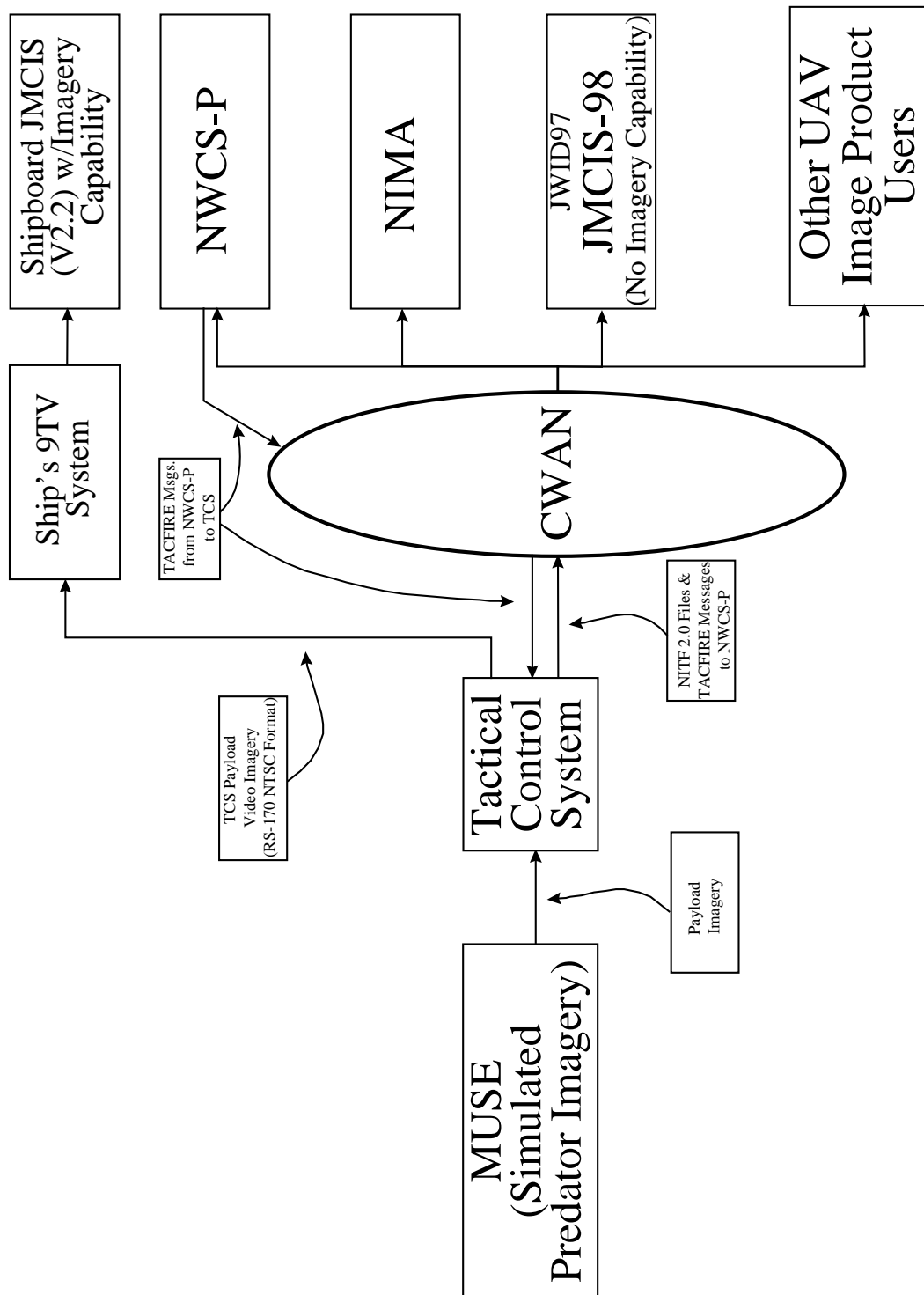


Figure 3-2. TCS/NWCS-P Interface in JWID97.

The interface type shall not affect the message format except as required by the specific interface to handle message routing, addressing, and other interface protocol requirements. The TCS and NWCS-P will be interconnected by an Ethernet LAN (ISO/IEC 8802-3: 1996 [ANSI/IEEE Standard 802.3, 1996 Edition]). This LAN will provide the medium for transmitting the TACFIRE messages and NITF 2.0 imagery files between the two systems. In addition, the TCS and the NWCS-P operators will have voice communications between the two systems.

3.2.2.1 NWCS-P to TCS Message Set

Table 3-1 indicates the message type and the purpose of the message which shall be sent from NWCS-P to TCS. A TACFIRE message shall be sent to the TCS in Artillery Target Intelligence:Coordinate Report (ATI:CDR) format via SMTP sendmail. The TCS shall route this message to a mail tool manually using the mail tool's functionality. These messages shall convey a cueing request to the TCS operator that a UAV be directed to a particular area to perform a reconnaissance or battle damage assessment mission. Refer to Section 3.2.3.1 and Appendices A & B for the detailed definition of the ATI:CDR message format.

Table 3-1. NWCS-P to TCS Message Set

Message Type	Interface(s)	Purpose
TACFIRE message (in ATI:CDR message format)	SMTP Mount	Alerts TCS about targets that are being picked up by CounterFire Radars or other sensors. Cues TCS as to potential target locations.

3.2.2.2 TCS to NWCS-P Message Set

Table 3-2 indicates the message types and the purpose of the messages which shall be sent from the TCS to the NWCS-P. The TCS shall send TACFIRE messages to the NWCS-P in ATI:CDR message format which contain target nomination and intelligence information reports and provide updated target location information. The message shall be sent via a Network File System (NFS) link, i.e., written to a file in a shared directory on the LAN or WAN interconnecting the TCS and NWCS-P. The TCS shall send UAV secondary imagery to the NWCS-P in NITF Version 2.0 format. These secondary imagery files shall be written to a shared directory on the LAN or WAN interconnecting the TCS and NWCS-P.

Table 3-2. TCS To NWCS-P Message Set

Message Type	Interface(s)	Purpose
TACFIRE messages (in ATI:CDR message format)	SMTP Mount	Target nomination and intelligence information reports
Imagery in NITF 2.0 format	Mount SMTP	Intelligence and Targeting information

3.2.2.3 TCS and NWCS-P Voice Communications

The TCS and the NWCS-P shall have voice communications between these two systems. The Multiple UAV Simulation Environment (MUSE) operator, the TCS operator, and the NWCS-P operator shall all have voice communications via a multiple station intercom system. This will provide clear voice communications between these operators during the JWID97 demonstrations.

3.2.3 Individual Data Element Characteristics

3.2.3.1 ATI:CDR Messages

The TCS shall send a TACFIRE message to the NWCS-P in ATI:CDR message format containing information regarding target nomination and intelligence information reports and providing updated target location information (Refer to section 3.2.2.2 and Table 3-2). A sample ATI:CDR message is shown in Figure 3-3 and the detailed contents of each field are defined in Appendices A and B. Appendix A defines the detailed contents of each field in the ATI:CDR formatted messages. Fields 1, 4, 9, 10, and 14 must contain entries, as a minimum. Fields 2, 12, 13, 18, 20, 24, and 34 are optional, but should also be completed (although this is not a mandatory requirement). The other fields are optional. Appendix B, Table B-1, defines the allowed target types and subtypes nomenclature. Appendix B, Table B-2, defines the allowed target elements nomenclature.

The NWCS-P shall send TACFIRE messages to the TCS in ATI:CDR message format described above. These messages will convey a cueing request to the TCS that a UAV be directed to a particular area to perform a reconnaissance or battle damage assessment mission. Also, refer to Table 3-1 for more information regarding NWCS-P to TCS TACFIRE message functionality.

These TACFIRE messages shall be created in the TCS using the TACCOM v1.6 message editor and shall be sent via an NFS link (also called an NFS mount), i.e., written to a file in a shared directory located on the NWCS-P hard disk drive. If the TCS report is in response to a TACFIRE ATI:CDR cueing message from the NWCS-P to the TCS, the TCS shall insert the target number (received from the NWCS-P in a previous message) in this outgoing ATI:CDR message being transmitted to the NWCS-P. If this is a target which is originating at the TCS, the TCS shall generate unique target numbers with the prefix TC, followed by a four digit number; e.g., the TCS shall use target numbers in the range TC0001 through TC9999.

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P:_;SB:_/_/_/_/_/_;C:___;SG:__,__,DT:__,__/_/_/_;ID:____;A:_;  
ATI;CDR;UPDATE:_;DELETE:_;TGT:_____;AGCY:_____;DNA:_;DNC:_;  
FR:_;COORD:___/_____/_____/_____;GZ:___;SPHERE:_;SIZE:_____/_____  
ATT:_____;TYPE:_____/_____;DOP:_____;LATI:___/___/___/_____.___/_____  
LONGI:___/___/___/_____.___/_____;RV:_____;REL:_;STR:_____;ALT:_____;RAT:_;  
CONF:_;DTG:___/___/___;CLOTHE:_;MASKTI:___;VEGAT:_____;PERMNC:_____;  
DISPO:_____/_____;CAS:_____;TD:___;MFI:_;PT:_____;  
PTM:_____;IS:
```

The TCS shall send UAV secondary imagery files and the associated Support Data to the NWCS-P in NITF Version 2.0 format. The TCS receives a simulated UAV analog video signal stream and a simulated UAV return link digital telemetry data stream from the Multiple UAV Simulation Environment (MUSE) system during JWID97 demonstrations. The TCS creates digital freeze frame secondary imagery extracted from the received simulated UAV analog video signal stream and creates the associated support data using information extracted from the simulated UAV return link digital telemetry data stream. The support data associated with the video signal contains such information as UAV latitude, longitude, and altitude; UAV sensor identification number, sensor depression angle, sensor field of view angle, payload azimuth, slant range, image center latitude and longitude; and the time and date the image was sensed by the UAV. Refer to the TCS to C⁴I Systems Interface Description for further details.

The TCS shall send secondary imagery with target positions from simulated live Outrider TUAV, Predator MAE UAV, and Pioneer UAV missions to the NWCS-P via LAN. In addition, NITF 2.0 files containing UAV secondary imagery and the associated support data shall be available to other systems via the Coalition WAN (CWAN). The TCS shall send both digital freeze frame images in NITF 2.0 format and the associated target information (TACFIRE) messages to the NWCS-P. The simulated Electro-Optical (EO) NITF 2.0 imagery stills files contain the associated support data in the text field.

Note: Imagery stills in NITF 2.0 format can be sent from the TCS to the JMCIS system; but, during JWID97, no NITF 2.0 imagery stills will be sent to the JMCIS-98 system used in the JWID97 demonstrations; since, the JMCIS-98 system installed for JWID97 will have no imagery capability. But, the TCS payload video imagery will be sent to the shipboard JMCIS V2.2.1 system during JWID97, via the shipboard 9TV System (See Figure 3-2).

3.2.5 Communication Methods Characteristics (Not applicable to these interfaces.)

3.2.6 Protocol Characteristics

The protocol reference model defined in this section fits within the framework of the seven layer International Standards Organization/Open Systems Interface (ISO/OSI) Protocol Reference Model. These seven layers are ordered sets where adjacent layers communicate through their common boundaries. These seven layers are referenced as physical, datalink, network, transport, session, presentation, and application layers. The layering concept shall be used to describe this protocol as it relates to the layered functions and services. Each of the seven layers perform specific functions and provide specific services that contribute to the overall communication process.

To provide a frame of reference, the following information shall define the basic characteristics of the protocol.

- a. The nodes within a single net shall be connected using bus technology.
- b. The signaling technique shall be basically broadband although there shall be only one data channel per cable.
- c. The access method to the network shall be Carrier Sense Multiple Access with Collision Detection (CSMA/CD).

3.2.7 Other Characteristics

The TCS and NWCS-P communicate via an Ethernet LAN (ISO/IEC 8802-3: 1996 [ANSI/IEEE Standard 802.3, 1996 Edition]). This LAN will provide the medium for transmitting the TACFIRE messages and NITF 2.0 imagery files between the systems. The TCS and NWCS-P will be interconnected via an Ethernet mini-hub using RJ45 connectors and unshielded twisted pair cables during the JWID97 demonstrations. This Ethernet LAN is connected to the CWAN using facilities provided by the USS John C. Stennis (CVN 74). The TCS payload video imagery signals will be sent to the shipboard 9TV CCTV system via RG-59/U shielded coaxial cable using BNC connectors.

The TCS to NWCS-P voice intercom system interconnects the MUSE operator, the TCS operator, and the NWCS-P operator. This voice communications capability is provided by a four station intercom system. Each operator will have a headset containing earphones and attached voice microphone. Each headset can be turned on or off by the headset user. This will provide clear voice communications between these operators during the JWID97 demonstrations.

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4. Qualification Provisions

This section defines the qualification methods to be used to ensure that each requirement of this interface has been met. These qualification methods include:

D	Demonstration	The operation of the interfacing entities that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis.
T	Test	The operation of the interfacing entities using instrumentation or special test equipment to collect data for later analysis.
A	Analysis	The processing of accumulated data obtained from other qualification methods. Examples are reduction, interpretation, or extrapolation of test results.
I	Inspection	The visual examination of code, documentation, etc.
S	Special	Any special qualification methods such as special tools, techniques, procedures, facilities, and acceptance limits.

Table 4-1 identifies the version of the NWCS-P system to be valid in JWID97. The version of the TCS system in use for JWID97 is Version 1.00.05.

Table 4-1. TCS/NWCS-P Interface — Qualification Methods

Requirement	C ⁴ I System (Version)	Qualification Method
1. Tactical Message a. ATI:CDR (NWCS-P to TCS) (Section 3.2.3.1) b. ATI:CDR (TCS to NWCS-P) (Section 3.2.3.1)	NWCS-P JWID97 NWCS-P JWID97	D, A D, A
2. Digital Imagery (Still) NITF 2.0 format (Section 3.2.3.2)	NWCS-P JWID97	D, A
3. Voice Communications (Sections 3.2.2.3 and 3.7)	—	D
4. Imagery a. TIFF b. Sunraster	N/A N/A	N/A N/A
5. Digital Imagery (Full Motion)	N/A	N/A
6. Analog Imagery RS-170/NTSC	N/A	N/A

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5. Requirements Traceability (This Section Has Been Tailored Out.)

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6. Notes

6.1 Background Information

The NWCS-P has the functionality to send TACFIRE messages to the TCS and to accept UAV secondary imagery and TACFIRE messages from the TCS. The NWCS-P performs targeting, assessment, and mission tasking functions using target positions obtained from intelligence data bases, the Common Operational Picture (COP), Military Strategic and Tactical Relay (MILSTAR) satellite broadcast voice, and UAV target messages. The NWCS-P, following appropriate assessment of potential targets from the multiple sources of information, shall issue the order to fire.

During JWID97, the two NWCS-P systems onboard the USS John Stennis will act as the primary NWCS-P coordination node, with NWCS-P systems on the USS Atlanta and the USS San Jacinto in supporting roles. Both the Atlanta NWCS-P and the San Jacinto NWCS-P will communicate with the Stennis NWCS-P systems, although there will not be a direct link to/from the Atlanta NWCS-P system or the San Jacinto NWCS-P system. All NWCS-P to NWCS-P communications will take place via a Unified Build Communication System (UBCS) channel. The actual communication pathways are TBD at this time [It may be via a T1 link, an Extreme High Frequency (EHF) link, or a Generic Front End Communications Processor (GFCP) system link]. Information communicated over these channels will be a combination of TACFIRE messages, USMTF messages, and internal NWCS-P communication protocols. A variety of information will be shared and coordinated among NWCS-P systems, including

- Mission Nominations
- Mission Location Updates
- Mission Assignments
- Mission Execution Status
- Mission Fired Reports
- Overlays
- Weapon Status
- Weapons Availability
- Fire Plans
- Fire Plan Execution Orders

6.1.1 TCS and NWCS-P Interfaces

The TCS and NWCS-P shall communicate through pre-defined message formats. The transmission method for these messages shall vary depending on the relative location of the two systems, and the available communications hardware. The types of interfaces are as follows:

- a. In cases where the systems are connected to a common Wide Area Network (WAN) or Local Area Network (LAN) infrastructure, they shall communicate using TACFIRE messages via the Simple Mail Transport Protocol (SMTP) capabilities resident on the WAN or LAN.

- b. In cases where the systems are connected to a common WAN or LAN infrastructure, and SMTP communication is not supported or otherwise impractical, they shall communicate by use of a common mount point (directory) on the NWCS-P computer hard disk drive.

6.1.2 Messages Transmitted Between the TCS and NWCS-P

Three types of messages shall be transmitted between the TCS and NWCS-P:

TACFIRE messages (from the NWCS-P to the TCS), TACFIRE messages (from the TCS to the NWCS-P), and imagery (from the TCS to the NWCS-P). These message types are explained below:

- a. TACFIRE messages from the NWCS-P to TCS —
The NWCS-P sends these TACFIRE messages to the TCS in ATI:CDR message format via SMTP sendmail. These messages will convey a cueing request to the TCS operator that a UAV be directed to a particular area to perform a reconnaissance or battle damage assessment mission. The TCS shall route these messages to a mail tool manually using the mail tool's functionality.
- b. TACFIRE messages from the TCS to the NWCS-P —
The TCS sends these TACFIRE messages to the NWCS-P in ATI:CDR message format. These TACFIRE messages shall contain target nomination and intelligence information reports and provide updated target location information. These messages shall be sent via a Network File System (NFS) link, i.e., written to a file in a shared directory.
- c. Imagery File Messages from the TCS to the NWCS-P —
The TCS sends UAV secondary imagery files to the NWCS-P in NITF version 2.0 file format. This shall be accomplished by writing the image files into a shared directory (an NFS mount) on the NWCS-P hard disk drive.

6.2 Acronyms and Abbreviations

Acronym	Acronym and Abbreviations Definitions
A	Analysis
ABN	Airborne
ACS	Aerial Common Sensor
ADOCS	Automated Deep Operations Coordination System
ADT	Air Data Terminal
AFATDS	Advanced Field Artillery Tactical Data System
AFMSS	Air Force Mission Support System
AMPS	Army Mission Planning System
APC	Armored Personnel Carrier
ARV	Armored Recovery Vehicle
ARV	Airborne Relay Vehicle
ASD	Assistant Secretary of Defense
ASAS	All Source Analysis System
AT	Antitank
ATHS	Automated Target Handoff System
ATI	Artillery Target Intelligence (: Coordinate Report)
ATWCS	Advance Tactical Weapons Control Station
AV	Air Vehicle
BMD	Boevaya Mashina Desantnika [literal Russian: Combat vehicle, airborne]
BMP	Boevaya Mashina Pekhoty [literal Russian: Combat vehicle, infantry amphibious armored]
BRDM	Boevaya Razvedyvatel'naya Dozornaya Mashina [literal Russian: combat reconnaissance patrol vehicle (amphibious armored scout)]
BTR	Bronetransporter [literal Russian: Amphibious armored transporter personnel carrier (series used as APCs)]
C ⁴ I	Command, Control, Communication, Computers, and Intelligence
C ⁴ ISR	C ⁴ I Surveillance - Reconnaissance
CARS	Contingency Airborne Reconnaissance System
CCTV	Closed Circuit Television
CDR	(Artillery Target Intelligence :) Coordinate Report
CGS	Common Ground Station
CIGSS	Common Imagery Ground/Surface System
CJCSM	Commander Joint Chiefs of Staff Memorandum
CSMA/CD	Carrier Sense Multiple Access with Collision Detection
COE	Common Operating Environment
COMPASS	Common Operational Modeling, Planning, and Simulation System
COP	Common Operational Picture
COSIP	Computer Open Systems Implementation Program
CWAN	Coalition WAN

D	Demonstration
DID	Data Item Description
DII	Defense Information Infrastructure
DISA	Defense Information Systems Agency
DL	Data Link
DoD	Department of Defense
DoDI	Department of Defense Instruction
EHF	Extreme High Frequency
EO	Electro-Optical
ETRAC	Enhanced Tactical Radar Correlator
FROG	Free Rocket Over Ground
GFCP	Generic Front End Communications Processor: The GFCP system provides the capability to allow communications between multiple tactical data processors (TDPs) via satellite communications.
HAE	High Altitude Endurance
HCI	Human Computer Interface
HDBK	Handbook
HOW	Howitzer
I	Inspection
IAS	Intelligence Analysis System
IDD	Interface Design Description
IPF	Integrated Processing Facility
IRS	Interface Requirements Specification
ISO/OSI	International Standards Organization/Open Systems Interface (Protocol Reference Model)
I&RTS	Integration and Runtime Specification
IVS	Integrated Video Subsystem
JDISS	Joint Deployable Intelligence Support System
JIEO	Joint Interoperability & Engineering Organization
JMCIS	Joint Maritime Command Information System
JMF	Joint Message Format
JPO	Joint Program Office
JROC	Joint Requirements Oversight Council
JROCM	JROC Memorandum
JSIPS-AF	Joint Service Imagery Processing System - Air Force
JSIPS-N	Joint Service Imagery Processing System - Navy
JSTARS	Joint Stand-off Target Attack Radar System
JTA	Joint Technical Architecture
JWID97	Joint Warrior Interoperability Demonstration 1997

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kHz	kiloHertz
LAN	Local Area Network
LRIP	Low Rate Initial Production
MAE	Medium Altitude Endurance
Mbps	Mega bits per second (1024 * 1024 bits per second)
MHz	MegaHertz (10 ⁶ Hertz)
MIES	Modernized Imagery Exploitation System
MIL	
MILSTAR	Military Strategic and Tactical Relay (satellite)
MRB	Motorized Rifle Battalion
MRL	Multiple Rocket Launcher
Msgs.	Messages
MTLB	Mashina Transportnaya Legkaya Boyevaya [literal Russian: vehicle, transport, combat]
MUSE	Multiple UAV Simulation Environment
NFS	Network File System
NIMA	National Imagery & Mapping Agency
NITF	National Imagery Transmission Format
NSFS	Naval Surface Fire Support
NSWCDD	Naval Surface Warfare Center Dahlgren Division
NTSC	National Transmission Standards Committee
NWCS-P	NSFS Weapon Control System - Prototype
ORD	Operational Requirements Document
PTM	Plain Text Message
PYLD	Payload
RGB	Red, Green, Blue
S	Special
SA	Surface-to-Air
SCUD	SCUD Missile System (enemy)
SMART	Selected Methods for Attracting the Right Targets [a bombing system]
SMTP	Simple Mail Transport Protocol
SP	Self-Propelled
SPIRIT	Special Purpose Integrated Remote Intelligence Terminal
SSS	System/Subsystem Specification
STD	Standard
T	Test

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T1	Bell System Model T1 digital communication system (1.55 M bits/second data rate)
TACFIRE	Tactical Fire (direction system)
TACCOM	Tactical Communications
TAMPS	Tactical Aircraft Mission Planning System
TBD	To Be Determined
TBMCS	Theater Battle Management Core System
TBMD	Theater Ballistic Missile Defense
TCS	Tactical Control System
TCIM	Tactical Communications Interface Module
TDP	Tactical Data Processor
TEG	Tactical Exploitation Group
TIDF-TE	(VMF) Technical Interface Design Plan - Test Edition
TLM	Telemetry
TUAV	Tactical Unmanned Aerial Vehicle
TV	Television
TWD	Towed
UAV	Unmanned Aerial Vehicle
UBCS	Unified Build Communication System
USA	United States Army
USAF	United States Air Force
USMC	United States Marine Corps
USMTF	United States Message Text Format
USN	United States Navy
UTM	Universal Transverse Mercator (coordinates system)
VCR	Video Cassette Recorder
VMF	Variable Message Format
WAN	Wide Area Network
ZSU	Soviet Antiaircraft (Cannon) Vehicle

APPENDIX A

TACFIRE Message Text Format

ATI:CDR Message Format

The actual ATI:CDR message fields are preceded by a header, as indicated below. This header is required so these messages can be transmitted via a Tactical Communications Interface Module (TCIM) routing interface. During the JWID97 demonstrations, the header fields will contain ASCII space characters. In the actual ATI:CDR message, fields 1, 4, 9, 10, and 14 must contain entries, as a minimum. Fields 2, 12, 13, 18, 20, 24, and 34 are optional, but should also be completed; this is not a mandatory requirement. The other fields are optional. Optional fields will contain ASCII space characters. Refer to the TCS-to-ADOCS Interface Design Description (IDD) and the ATI:CDR message defining document (FSSIS-IS-0001, Revision B, paragraph 4.4.7.6, dated 1 September 1994) for further details.

Identifier: ATI:CDR

Message Number: 2006

Message Name: Artillery Target Intelligence Coordinate Report Message

Function Or Purpose: This message is used to transmit new or updated target descriptive information or to provide target location data based on Universal Transverse Mercator (UTM) coordinates.

Message Format:

```
P : _ ; SB : _ / _ / _ / _ / _ ; C : _ _ _ ; SG : _ , _ _ ; DT : _ , _ _ / _ _ / _ _ ; ID : _ _ _ _ ; A : _ ;
ATI : CDR ; UPDATE : _ ; DELETE : _ ; TGT : _ _ _ _ _ ; AGCY : _ _ _ _ _ ; DNA : _ ; DNC : _ ;
FR : _ ; COORD : _ _ / _ _ _ _ _ / _ _ _ _ _ ; GZ : _ _ _ ; SPHERE : _ ; SIZE : _ _ _ _ / _ _ _ _ ;
ATT : _ _ _ _ ; TYPE : _ _ _ _ _ / _ _ _ _ _ ; DOP : _ _ _ _ _ ; LATI : _ / _ _ / _ _ . _ _ / _ _ _ _ ;
LONGI : _ / _ _ _ / _ _ / _ _ . _ _ / _ _ _ _ ; RV : _ _ _ ; REL : _ ; STR : _ _ _ _ ; ALT : _ _ _ _ ; RAT : _ ;
CONF : _ ; DTG : _ _ / _ _ / _ _ ; CLOTHE : _ ; MASKTI : _ _ _ ; VEGAT : _ _ _ _ ; PERMNC : _ _ _ _ ;
DISPO : _ _ _ _ / _ _ _ _ ; CAS : _ _ _ _ ; TD : _ _ ; MFI : _ ; PT : _ _ _ _ _ _ _ _ ;
PTM : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ ; S :
```

Field Definitions:

#	Data Element Name & Description	MN	Use *	Size	Range Values
1.	Message Identifier Identifies the message as a ATI:CDR	ATI:CDR	M		
2.	Update Indicator Indicates that the data contained in this report is to be used to update an existing target.	UPDATE	S	1	X
3.	Delete Indicator Indicates the specified data is to be deleted.	DELETE	O	1	X

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#	Data Element Name & Description	MN	U s e *	Size	Range Values
4.	Target Number The alphanumeric characters which represent the originator and a specific target. The six characters of the target number are divided into two groups. The first group is 2 letters, the second is four digits.	TGT	M	6	AA to ZZ (first 2 chars) and 0000 to 9999 (last four chars)
5.	Target Acquisition Source Type Indicates the type of agency reporting the target.	AGCY	O	10	A to Z, 0 to 9
6.	Do Not Adjust Indicator Indicates that the location reported in the message is not to be adjusted.	DNA	O	1	X
7.	Do Not Combine Indicator Indicates that the target intelligence should not be combined with other reports.	DNC	O	1	X
8.	Fire Request Indicator Indicates if the message should generate a Call for Fire..	FR	O	1	X
9.	Coordinate Indicates the location of the target in UTM grid coordinates. Easting in Meters Northing in Meters Altitude relative to MSL in meters	CORD	M	21 2 6 8 5	1 to 30 0 to 999999 0 to 11000000 -9999 to +9999
10.	Grid Zone Designator Indicates the grid zone of the target coordinate	GZ	M	3	-60 to +60
11.	Sphere The code for the spheroid of the reported coordinates.	SPHERE	O	1	1 = Clark 1866 2 = International 3 = Clark 1880 4 = Everest 5 = Bessel 6 = User Specified 8 = Australian National
12.	Size Indicates the target size in meters. Radius/Length in meters Width in meters A single entry indicates a radius; two entries indicate a Length and Width (in this order).	SIZE	S	8 4 4	1 to 9999 1 to 9999
13.	Attitude The attitude or orienting azimuth of the long axis of a rectangular target in mils. You must make an entry if both length and width are entered in SIZE.	ATT	S	4	0 to 6399
14.	Target Type Specifies the target type and subtype. Target Type Subtype	TYPE	M	12 6 6	See Appendix B, Table B-1, Target Types & Subtypes.
15.	Degree of Protection The degree of protection of the target.	DOP	O	6	PRAND = Half prone, half standing PRONE = Prone PRUG = Prone and dug in PROVER = Prone and under overhead cover DUGIN = Dug in COVER = Under overhead cover
16.	Latitude The target location Latitude expressed as . Hemisphere Degrees Minutes Seconds Altitude in meters	LATI	O	14 1 2 2 5 5	N or S 0 to 90 0 to 59 0.00 to 59.99 -9999 to +9999

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#	Data Element Name & Description	MN	U s e *	Size	Range Values
17.	Longitude The target location Latitude expressed as . Hemisphere Degrees Minutes Seconds Altitude in meters	LONGI	O	14 1 3 2 5 5	E or W 0 to 180 0 to 59 0 to 59.99 -9999 to +9999
18.	Report Value Indicates the accuracy of the reporting agency in Meters	RV	S	3	0 to 999
19.	Reliability Indicator A general appraisal of the source in graded terms to indicate the extent to which it has been proven that it can be counted on or trusted to do as expected.	REL	O	1	F = Fair G = Good E = Excellent
20.	Strength The quantity of target type(s)/subtype(s) reported in the specified area.	STR	S	4	1 to 9999
21.	Altitude the altitude of the target as measured radially outward from the earth as a quantity above mean sea level(MSL) in meters.	ALT	O	5	-9999 to 9999
22.	Record as Target Indicator Indicates that the intelligence report is to be recorded as a target, and to update the intelligence database.	RAT	O	1	X
23.	Confirmed Target Indicator Indicates that only confirmed targets are to be retrieved from the intelligence file.	CONF	O	1	X
24.	Date Time Group The date time group of the target sighting. Effective Day Effective Hour Effective Minute	DTG	S	6 2 2 2	 01 to 31 00 to 23 00 to 59
25.	Clothing Indicates the type of clothing worn by personnel in the target area including masking indicator.	CLOTHE	O	1	A= Topical uniform with or without mask B = Masked with summer uniform C = Masked, hooded and gloved with summer uniform, or masked with winter uniform D = Masked hooded and gloved with winter uniform
26.	Masking Training Indicates the enemy level of training in Nuclear, biological, and Chemical (NBC) protection.	MASKTI	O	3	15S = Indicates that personnel are well trained in NBC protection and are assumed masked within 15 seconds from time of the first recognition of chemical attack. 30S = Indicates that personnel are poorly trained and can be assumed masked within 30 seconds. TOD = Indicates that personnel to not have protective clothing (Total Dose).
27.	Vegetation Indicates the type of vegetation in the target area.	VEGAT	O	5	BARE = Terrain is bare, open or covered with sparse grass SHRUB = Terrain is generally covered with low bushes or shrubs. WOODS = Terrain is thickly wooded.
28.	Target Permanence The estimated time a target will remain at it reported location.	PERMNC	O	4	0001 = 0 to 1 hours 0103 = 1 to 3 hours 0312 = 3 to 12 hours 1224 = 12 to 24 hours 2400 = more than 24 hours
29.	Disposition Indicates the results of effects achieved from artillery or Naval Gun Fire fires on a target.. Two iterations are permitted. BURN is the only value permitted in the second iteration.	DISPO	O	4 or 9	NEUT = Fires delivered have reduced the combat effectiveness of the target. EST = Fires have destroyed the material attacked. CNO = Fires Delivered were not observed. NONE = Fires delivered had no significant effect BURN = Burning UNK = Unknown

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#	Data Element Name & Description	MN	U s e *	Size	Range Values
30.	Casualties The total number of enemy Killed in Action (KIA) or Wounded in Action (WIA).	CAS	O	4	0 to 9999
31.	Target Data Type Indicates how the initial target location was determined.	TD	O	2	A = Azimuth Report (Single) AC = Azimuth Report (Constituent) C = Coordinate Report (Single) CC = Coordinate Report (Constituent) CS = Coordinate Report (Solution) S = Shell Report M = Mission Fired Report MC = Mission Fired Report (Constituent) MS = Mission Fired Report (Solution) MV = Moving Target
32.	Mission Fired Indicator Indicates that the reported target location has been fired upon.	MFI	O	1	X
33.	Plain Text Plain text message stored in the tactical system's database, containing Target Description. A TCS operator entered field.	PT	O	12	All characters, except the backwards slash (\) character.
34.	Plain Text Message Plain text message for information only, containing Target Remarks. A TCS operator entered field.	PTM	S	29	All characters, except the backwards slash (\) character.

* Use codes: M = Mandatory data field; S = Optional; but, data Should be provided in message; O = Optional.

APPENDIX B

Tables of Legal Values for Target Types

TARGET TYPES AND SUBTYPES

This table defines target types and subtypes. The types/subtypes which are legal HE effects targets (E) are indicated. The table also gives the valid target elements for each subtype. Refer to Table B-2 for target elements definition.

Table B-1. Target Types and Subtypes

TYPE	SUBTYPE	DESCRIPTION	VALID TARGET ELEMENTS
ADA		Air Defense Artillery	
	UNK (E)	Unknown	None
	LT (E)	Light	AI, AJ, (AI-2) *
	MDM (E)	Medium	BV
	HV(E)	Heavy	AK (AK-2) *
	MSL (E)	Missile	AL, AM, AN, AO, AP, (AN-3) *
	POS (E)	Position	None
ARMOR		Armor	
	UNK	Unknown	None
	LT (E)	Light	A, B, D, E, BB, BE, BF, BG, BH, BJ, BK (D-3) *
	MDM	Medium	F, G, BC, (G-4) *
	HV	Heavy	C, BL (C-4) *
	APC (E)	Armored personnel carrier	A, B, D, E, BB (A-3) *
	POS (E)	Position	None
ARTY		Artillery	
	UNK	Unknown	None
	LT (E)	Light	K, L, M, U (M-6) *
	MDM (E)	Medium	N, O, P, Q, R (P-6) *
	HV	Heavy	S (S-6) *
	POS (E)	Position	None
ASSY		Assembly Area	
	UNK (E)	Unknown	None
	TRP (E)	Troops	None
	TRPVEH (E))	Troop and vehicles	None
	TRPMEC (E)	Mechanized troops	None
	TRPARM (E)	Troops and armor	None
	TACBTR	Motorized Rifle Battalion (MRB) tactical (BTR)	A, B, C, D, E, AI, AJ, BB (A-40) *
	ADMBTR	MRF administrative (BTR)	A, B, D, E, BB, BD, BI, BR, BS, BT, BU (A-37) *
	TACBMP	MRB tactical (BMP)	A, B, C, D, E, AI, AJ, BB (D-40) *
	ADMBMP	MRB administrative (BMP)	A, B, D, E, BB, BD, BI, BR, BS, BT, BU (D-36) *
	TNKBNT	Tank battalion tactical	A, B, C, D, E, AI, AJ, BB (C-31)

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TYPE	SUBTYPE	DESCRIPTION	VALID TARGET ELEMENTS
			*
	TNKBNA	Tank battalion administrative	A, B, C, D, E, BB, BD, BI, BR, BS, BT, BU, (C-31) *
	SPRTEL	Support Element	BD, BI, BR, BS, BT, BU, (BR-44) *
BLDG		Building	
	UNK	Unknown	None
	WOOD	Wood	None
	MASNRY	Masonry	None
	CONC	Concrete	None
	MET	Metallic	None
	SPCL	Special	None
BRIDGE		Bridge	
	UNK	Unknown	None
	FTPON	Foot pontoon	None
	VEHPON	Vehicle pontoon	None
	CONC	Concrete	None
	WOOD	Wood	None
	STEEL	Steel	None
	SITE	Site	None
	RAFT	Raft	None
	FERRY	Ferry	None
CEN		Center	
	UNK	Unknown	None
	SMALL	Small	None
	BN	Battalion	None
	REGT	Regiment	None
	DIV	Division	None
	FWD	Forward	None
EQUIP		Equipment	
	UNK (E)	Unknown	None
	RADAR (E)	Radar	AD, AE, AF, AG, AH, AQ, AR, AS, AT, AU, AV, AW, AX, AZ, (AU-1) *
	EW (E)	Electronic	None
	SLT (E)	Searchlight	None
	GDNC (E)	Guidance unit	AY (AY-1)
	LS (E)	Loud speaker	None
FORM		Formation	
	AGBBTR	MRR advance guard battalion (BTR)	A, B, C, D, E, N, O, P, Q, R, BB (A-40, C-13, P-6) *
	AGBBMP	MRR advance guard battalion (BMP)	A, B, C, D, E, N, O, P, Q, R, BB (D-40, C-13, P-6) *
	AGBTKR	Tank regiment advance guard battalion	A, B, C, D, E, N, O, P, Q, R, BB (C-31, B-13, P-6) *
	MRBMNR	MRB main (BTR)	A, B, C, D, E, N, O, P, Q, R, BB (A-40, C-13, P-6) *
	MRBSPR	MRB support (BTR)	A, B, C, D, E, N, O, P, Q, R, BB (A-40, C-13, P-6) *
	MRBMNP	MRB main (BMP)	A, B, C, D, E, N, O, P, Q, R, BB

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TYPE	SUBTYPE	DESCRIPTION	VALID TARGET ELEMENTS
			(D-40, C-13, P-6) *
	MRBSPP	MRB support (BMP)	A, B, C, D, E, N, O, P, Q, R, BB (D-40, C-13, P-6) *
	TNKBNM	Tank battalion main	A, B, C, D, E, N, O, P, Q, R, BB (C-31, D-13, P-6) *
	TNKBNS	Tank battalion support	A, B, C, D, E, N, O, P, Q, R, BB (C-31, D-13, P-6) *
MORT		Mortar	
	UNK	Unknown	None
	LT	Light	H, I (H-1) *
	MDM	Medium	J (J-1) *
	HV	Heavy	T (T-1) *
	VH	Very heavy	None
	POS	Position	None
PERS		Personnel	
	UNK	Unknown	None
	INF	Infantry	None
	OP	Observation post	None
	PTL	Patrol	None
	WKPTY	Work party	None
	POS	Position	None
RKTMSL		Rocket missile	
	UNK (E)	Unknown	None
	APERS (E)	Antipersonnel	None
	LTMSL (E)	Light missile	V, W, X, (V-1) *
	MDMMSL (E)	Medium missile	Y, AA (Y-1) *
	HVMSL (E)	Heavy missile	Z, AB, AC (AC-1) *
	ATANK (E)	Antitank	None
	POS (E)	Position	None
SPEC		Special	
	GASNON	Gas non-persistent	None
	GASPER	Gas persistent	None
SUPPLY		Supply	
	UNK	Unknown	None
	AMMO	Ammunition	None
	PTL	Petroleum oil	None
	BRGEQ	Bridging equipment	None
	CLI	Class A	None
	CLII	Class B	None
TER		Terrain Features	
	UNK	Unknown	None
	ROAD	Road	None
	JCT	Road junction	None
	HILL	Hill	None
	DEFILE	Defilade	None
	LDGSTR	Landing strip	None
	RR	Railroad	None
VEH		Vehicle	
	UNK (E)	Unknown	None
	LTWHL (E)	Light wheeled	BA, BU, (BU-1) *

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TYPE	SUBTYPE	DESCRIPTION	VALID TARGET ELEMENTS
	HVWHL (E)	Heavy wheeled	BD, BI, BR, BS, BT (BS-1) *
	RECON	Reconnaissance	A, B, D, E, BB (B-1) *
	BT (E)	Boats	None
	ACFT (E)	Aircraft	None
	HEL (E)	Helicopter	BM, BN, BO, BP, BQ (BM-1) *
WPN		Weapon	
	UNK	Unknown	None
	LTMG	Light machine gun	None
	HVMG	Heavy machine gun	None
	ATG	Antitank gun	None
	RCLR	Recoilless rifle	None
	POS	Position	None

*Default target element and strength for SMART munitions

TARGET ELEMENTS

This table lists and defines target elements.

Table B-2. Target Elements

Entry	Definition
	Maneuver
A	BTR 60/70/80
B	BRDM - 2 and VARIATIONS
C	T64, T72, T80
D	BMP
E	BMD
F	MTLB and VARIATIONS
G	T54/55 ARV
	Artillery
H	82 MM MORTAR (M1937)
I	82 MM AUTO MORTAR (VASILEK)
J	120 MM TWD MORTAR (M1943)
K	120 MM COMBINATION GUN (ABN) (M1981)
L	122 MM TWD HOW (D30)
M	122 MM SP HOW (2S1)
N	152 MM TWD HOW (D20)
O	152 MM SP HOW (2S3)
P	152 MM SP HOW (DANA GUN)
Q	152 MM TWD GUN (M1976)
R	152 MM SP GUN (2S5)
S	203 MM SP GUN (M1975)
T	240 MM SP MORTAR (M1975)
U	100 MM AT GUN (MT-12)
V	122 MM MRL (BM21)
W	122 MM MRL (ABN) (M1975)
X	122 MM MRL (RM70)
Y	220 MM MRL (BM-27)
Z	FROG 7
AA	SS-21
AB	SCUD
AC	SS-23
	Battlefield and Artillery Radar
AD	BIG FRED ON MTLB
AE	SMALL FRED ON MTLB
AF	*"ALLOCATED"
AG	*"ALLOCATED"
AH	PSNR 1 BUZZ STAND
	Air Defense
AI	ZSU - 23
AJ	ZSU - 23 - 4 WITH RADAR
AK	S-60 57 MM AAA
AL	SA - 9/SA - 13 (TELAR)

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Entry	Definition
AM	SA - 8/SA - 8B (TELAR)
AN	SA - 6/SA - 11 (TELAR)
AO	SA - 4/SA - 12 (TELAR)
AP	*"ALLOCATED"
AQ	*"ALLOCATED"
	Air Defense Artillery Radar
AR	STRAIGHT FLUSH SAG
AS	PAT HAND SA - 4
AT	BILL BOARD SA - 12
AU	LONG TRACK TARGET ACQ
AV	FLAT FACE (EARLY WARNING)
AW	THIN SKIN (HEIGHT FINDER)
AX	*"ALLOCATED"
AY	FIRE CAN (FIRE CONTROL FOR S - 60)
AZ	SPOON REST TARGET ACQ
	Engineers
BA	DIM MINE DETECTOR TRUCK MOUNTED
BB	UR67 MINE CLEARER BTR 50 PK
BC	MTU TANK LAUNCHER BRIDGE
BD	TMM TRUCK LAUNCHER BRIDGE
BE	MDK2M/BTM DITCHER EXCAVATOR
BF	IMR ARMORED ENGINEER TRACTOR
BG	BAT M ARMORED DOZER
BH	PTS M TRACKED AMPHIBIAN
BI	PMP PONTOON BRIGADE SET
BJ	GMZ TRACKED MINELAYER
BK	*"ALLOCATED"
BL	*"ALLOCATED"
	Helicopter
BM	HIND E MI 24
BN	HIP MI 8/17
BO	HALO MI 26
BP	HOUND MI 4
BQ	*"ALLOCATED"
	Trucks
BR	ZIL 157
BS	KRAZ 214
BT	URAL 375
BU	GAZ 66
	Other
BV	*"ALLOCATED"

*"ALLOCATED" = A classified target element.